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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/260,257	03/02/1999	MASAFUMI TSUTSUI	FUJI-15.641	6304

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EXAMINER

WILLIAMS, LAWRENCE B

ART UNIT	PAPER NUMBER
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2634

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DATE MAILED: 07/31/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/260,257

Applicant(s)

TSUTSUI ET AL.

Examiner

Lawrence B Williams

Art Unit

2634

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 March 1999.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 15-18 is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 March 1999 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1,2,3,4,5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted Prior Art (09/260257) in view of Rao et al. (US Patent 5,514,612).

(1) With respect to claim 1, applicant's admitted prior art discloses in Figs. 10 and 11, an interference canceller device for a DS-CDMA communication system including low-rate channels and high-rate channels (page 1, lines 11-14), comprising: an interference replicating unit (103-21-103-2k) being associated with the high-rate channels for creating interference replicas (page 2, lines 11-12) of the high rate channels from received signals; and an adder (104-1) for subtracting the interference replicas from the received signals (page 2, lines 12-13).

Applicant's Admitted Prior Art does not however disclose subtracting only the interference replicas of the high rate channels from the received signals.

However, Rao et al. teaches that high-speed data lines operate at very high frequencies and produce EMI/RFL (col. 1, lines 33-37; 46-51). It is also well-known in the art that as the data rate goes up, so does the interference in any data communications system.

One skilled in the art would have clearly recognized that subtracting only the interference replicas of the high rate channels from the received signals is a well-known technique introduced

Art Unit: 2634

in many references. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to apply the teachings of Rao et al. modify the invention of Applicant's Admitted Prior Art to eliminate interference from the system. It is well known that high data rate transmission requires higher transmit power which in turn degrades the low-rate channels. Eliminating the interference from the high rate channels would inherently remove interference throughout the system.

(2) With regard to claim 2, claim 2 inherits all limitations of claim 1. Furthermore, applicant's admitted prior art also discloses the device, which further includes a delay circuit (102-2) for delaying the received signals to the adder.

(3) With regard to claim 3, claim 3 inherits all limitations of claim 1. Furthermore, applicant's admitted prior art also discloses in Fig. 11, the device wherein the interference replicating unit includes a despread processing part (113).

(4) With regard to claim 4, applicant's admitted prior art also discloses in Fig. 13, a searcher (153) for detecting different based on a delay profile of the received signals (page 7, lines 1-2) and allocating the despread processing part of the interference replicating unit to the paths detected (lines 10-15).

(5) With regard to claim 5, applicant's admitted prior art also discloses in Fig. 13, wherein the searcher includes a memory (165) for storing a threshold value for detecting paths of the low-rate channels, a path detection unit for detecting paths of the high-rate channels based on the threshold value stored and then allocating the despread processing parts of the interference replicating unit to the paths detected (page 7, lines 3-15; page 8, lines 1-4).

Art Unit: 2634

3. Claims 6,7,8,11,12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sawahashi et al. (US Patent 6,137,788) in view of Rao et al. (US Patent 5, 514,612).

(1) With regard to claim 6, Sawahashi et al. discloses in Fig. 4, a radio communication device for a DS-CDMA communication system including low-rate channels and high-rate channels, comprising: an interference canceller (106) including an interference replicating unit (106-108) being associated with the high-rate channels for creating interference replicas of the high rate channels from received signals and an adder (Fig. 5A,B; 204-k) for subtracting the interference replicas from the received signals (col. 13, lines 3-23) producing interference-eliminated signals; and a receiver for the low rate channels performing demodulation on the interference-eliminated signals (Fig. 4; col. 13, lines 56-67).

Sawahashi et al. does not however disclose subtracting only the interference replicas of the high rate channels.

However, Rao et al. teaches that high-speed data lines operate at very high frequencies and produce EMI/RFL (col. 1, lines 33-37; 46-51). It is also well-known in the art that as the data rate goes up, so does the interference in any data communications system.

One skilled in the art would have clearly recognized that subtracting only the interference replicas of the high rate channels from the received signals is a well-known technique introduced in many references. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to apply the teachings of Rao et al. modify the invention of Applicant's Admitted Prior Art to eliminate interference from the system. It is well known that high data rate transmission requires higher transmit power which in turn degrades the low-rate channels.

Art Unit: 2634

Eliminating the interference from the high rate channels would inherently remove interference throughout the system.

(2) With regard to claim 7, claim 7 inherits all limitations of claim 6. Furthermore, Sawahashi et al. also discloses in Fig. 5A, the device which further includes a delay circuit (203-2) for delaying the received signals to the adder.

(3) With regard to claim 8, claim 8 inherits all limitations of claim 6. Furthermore, Sawahashi et al. also discloses in Fig. 5A, the device, wherein the interference replicating unit includes a despread processing part (211; col. 13, lines 35-37).

(4) With regard to claim 11, Sawahashi et al. also discloses an interference cancelling method for a DS-CDMA communication system including low-rate channels and high-rate channels, the method comprising the steps of creating interference replicas from received signals for the high-rate channels (col. 27, lines 21-28); and subtracting the interference replicas from the received signals for the high rate channels (col. 7, lines 21-28) producing interference-eliminated signals (col. 10, lines 46-67).

(5) With respect to claim 12, claim 12 inherits all limitations of claim 11. Furthermore, Sawahashi et al. also discloses the method, which further includes delaying the received signals before subtracting the interference replicas (Fig. 5A).

(6) With regard to claim 13, claim 13 inherits all limitations of claim 11. Furthermore, Sawahashi et al. also discloses demodulating the interference-eliminated signals (col. 26, lines 21-27).

4. Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Art Unit: 2634

Sawahashi et al. (US Patent 6,137,788) and Rao et al. (US Patent 5,514,612) as applied to claim 8 above, and further in view of Applicant's Admitted Prior Art (09/260257).

As noted above, Sawahashi et al. in combination with discloses all limitations of claim 8. He does not however disclose a searcher for detecting different paths based on a delay profile of the received signals and allocating the despread processing part of the interference replicating unit to the paths detected.

However, Applicant's Admitted Prior Art teaches a searcher for detecting different paths based on a delay profile of the received signals and allocating the despread processing part of the interference replicating unit to the paths detected (col. 16, lines 18-36; col. 17, lines 26-36).

One skilled in the art would have clearly recognized that a searcher for detecting different paths based on a delay profile of the received signals and allocating the despread processing part of the interference replicating unit to the paths detected is also a well-known technique introduced in many references. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to apply the method as taught by Applicant's Prior Art to modify the invention of Sawahashi et al. as another method to synthesize received signals on the basis of direction of arrival.

(2) With respect to claim 10, claim 9 inherits all limitations of claim 8. Furthermore, Applicant's Prior Art also teaches wherein the searcher includes a memory for storing a threshold value for detecting paths of the low-rate channels, a path detection unit for detecting paths of the high-rate channels based on the threshold value stored and then allocating the despread processing parts of the interference replicating unit to the paths detected (page 7, lines 3-15).

5. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sawahashi et al. (US Patent 6,137,788) in combination with Rao et al. (US Patent 5,514,612) and further in view of Forssen et al. (US Patent 6,173,014 B1).

Sawahashi et al. discloses in Fig. 4, an interference replicating unit (106; col. 12, lines 56-67; col. 13, lines 1-8) for a DS-CDMA communication system, comprising: a plurality of despreading parts producing despread signals (col. 9, lines 65-67); a decision part coupled to the despreading parts for providing decision output signals (col. 7, lines 44-45) and a plurality of resspreading parts, coupled to the decision part for resspreading the decision output signals (col. 7, lines 49-52).

Sawahashi et al. does not, however disclose an interference-replicating unit for a DS-CDMA communication system including a multi-array antenna or a plurality of despreading parts for despreading signals received from the multi-array antenna. Sawahashi et al. does disclose reception of signals received through a plurality of channels.

However, Forssen et al. teaches an interference rejection combining technique for a cellular radio communications system including a multi-array antenna (col. 3, lines 9-20).

Neither Sawahashi et al. nor Forssen et al. disclose creating only interference replicas of the high rate channels.

However, Rao et al. teaches that high-speed data lines operate at very high frequencies and produce EMI/RFL (col. 1, lines 33-37; 46-51). It is also well known in the art that as the data rate goes up, so does the interference in any data communications system.

One skilled in the art would have clearly recognized that a CDMA communication

Art Unit: 2634

system including a multi-array antenna and creating interference replicas of the high rate channels is a well-known technique introduced in many references. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to apply the teachings of Forssen et al. to the invention of Sawahashi et al. in combination with Rao et al. combat multipath fading in the system by eliminating the main cause of the interference, the high rate channels.

Allowable Subject Matter

6. Claims 15-18 are allowed.

7. The following is a statement of reasons for the indication of allowable subject matter: The present invention comprises an interference canceller for a DS-CDMA communication system. The closet prior art (Sato) shows a similar method. However, the prior art fails to disclose, either the searcher comprising a path selection part for selecting paths in the delay profile for the high-rate channels exceeding a first threshold or setting a first threshold and selecting paths in the delay profile for the low-rate channels exceeding the first threshold.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a.) Storm et al. US Patent 6,175,561 B1 discloses a method and apparatus for acquiring a

Art Unit: 2634

pilot signal in a CDMA receiver.

b.) Banister US Patent 6,456,647 B1 discloses a two-step signal scheme for a receiver.

c.) Iwaskai et al. US Patent 6,421,369 B1 discloses a receiving method and receiver for spread spectrum signal.


9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lawrence B Williams whose telephone number is 703-305-6969. The examiner can normally be reached on Monday-Friday (8:00-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on 703-305-4714. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9314 for regular communications and 703-872-9314 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-4750.

Lawrence B. Williams

lbw
July 28, 2003



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